British Heart Journal, 1972, 34, 959–965.

Proceedings of the British Cardiac Society

THE FIFTY-FIRST ANNUAL GENERAL MEETING of the British Cardiac Society was held at St. Bartholomew's Medical College, London, on Thursday, 23 March 1972. The President, SIR JOHN McMICHAEL, took the Chair at 9.30 a.m. during Private Business. At the Scientific Session which followed the Chair was taken by TIMOTHY COUNIHAN.

Private Business

1 The President reported with deep regret the deaths of Lenègre and Schrire.

2 The Minutes of the Autumn Meeting having been published in the Journal (1972, 34, 201–209) were taken as read and confirmed.

3 The Treasurer reported that the Society's auditor was retiring and that Council had asked him to obtain quotations for our work from a number of firms. Council was anxious that the accounts should be prepared promptly and to a high standard.

In line with the rise in the stock market, the Society's investments have further appreciated and arrangements are being made for these investments to be reviewed periodically. On our Brokers' advice the sum of £1,000 set aside for the Buenos Aires travel fund will be invested in English and Caledonian 3½% debentures stock 1975.

The Treasurer reported that costs of all kinds were rising steadily and that the running expenses of the Society were no longer met entirely from members' subscriptions. Part of our investment income was being used for this purpose. Some of the increased costs were avoidable and resulted from members failing to meet deadlines for the submission of abstracts and so on. The Treasurer thought that the annual subscription might shortly have to be raised to £12. This would more than meet our expenses at the present time but it was hoped to retain the subscription at this level for three years and by the end of this period we should probably be in deficit again.

4 The proposed amendment to Rule 8 was considered, but the wording was felt to be open to possibly misinterpretation, and this was referred back for the Secretary to discuss with the President and redraft.

Rule 13 was amended to read as follows:

'In addition to those specified in Rule 7, Overseas Members may be elected from British cardiologists employed abroad and who would otherwise be eligible for Ordinary Membership.'

5 John Goodwin was elected *President* of the Society on the retirement of Sir John McMichael.

6 Edgar Sowton, Assistant Honorary Secretary, was elected *Honorary Secretary* on completion of John Hamer's term of office.

7 Arthur Hollman was elected *Assistant Honorary Secretary*.

8 The following two new *Members of Council* were elected in place of Whitaker and Davison:

Semple and Barritt.

It was agreed that H. A. Fleming, who was third in the ballot, should be co-opted to the Council in place of Hollman who had been elected Assistant Honorary Secretary, his term of office to run to the date when Hollman would have retired in succession from Council, i.e. 1975.

9 The following resignations on retirement were accepted:

Sir Charles Burns (New Zealand), Gumpert, Sir Ian Hill, R. E. B. Hudson, Lendrum, A. Logan, McMichael, and Swan.

10 Sir Ian Hill and Sir John McMichael were elected *Honorary Members* of the Society.

11 Gumpert, R. E. B. Hudson, Lendrum, A. Logan, and Swan were elected *Extra-Ordinary Members* of the Society.

12 Guy Hallwright of New Zealand and Shantilal J. Shah of India were elected *Corresponding Members* of the Society.

13 The following new *Ordinary Members* were elected:

A. M. Breckenridge (London), D. B. Clarke (SM) (Birmingham), P. B. Deverall (SM) (Leeds), D. J. Eddy (Birmingham), J. S. Geddes (Belfast), L. Gonzalez-Lavin (SM) (London), C. G. H. Newman (London), D. Pickering (Oxford), J. M. Reid (Glasgow), E. Shinebourne (London), I. McG. D. Stewart (Blackpool), M. J. Tynan (Newcastle), and E. M. Vaughan Williams (Oxford).

14 The following *Overseas Members* were re-elected:

Binnion, Hywel Davies, Fulton, Harries, Humphreys, Opie, Parry, Rahimtoola, Resnekov, Segel, Seymour, Somers, and Wilson.

15 The Autumn Meeting of the Society would be held at the Royal College of Physicians on 9 and 10 November 1972.

16 The Annual General Meeting in 1973 would be held in Glasgow on Thursday, 12 April.

17 Goodwin reported that the Specialist Advisory Committee on Cardiology of the Joint Committee on Higher Medical Training of the Royal College of Physicians of London, Edinburgh, Glasgow and Ireland, had formed a subcommittee with the Specialist Advisory Committee on Paediatrics to formulate training recommendations for Paediatric Cardiology. The members of the subcommittee were:

Goodwin (Chairman), Walter Somerville: Representing general cardiology.
Hamish Watson: Representing paediatric cardiology.
T. E. Oppe, A. D. M. Jackson: Representing general paediatrics.
J. D. Hay, Olive Scott: Co-opted members representing paediatric cardiology.

The following recommendations were made:

The paediatric cardiologist will require training in general paediatrics, neonatal paediatrics, adult cardiology, and paediatric cardiology. Trainees may approach paediatric cardiology either from paedi-

atrics or from cardiology. Therefore rigid schedules cannot be laid down, but after the preregistration year there should be 2 years of general professional training with a minimum requirement of 1 year in paediatrics, to include experience in neonatal paediatrics. After this, approximately 5 years should be spent in *approved* training in paediatric cardiology.

It was felt that the trainee in paediatric cardiology would not require 3 years of general professional training and that the time would be better spent in general paediatrics, paediatric cardiology, and adult cardiology. In view of the complications of training it was felt unwise to be more specific with regard to details of cardiological training, at the present time, as trainees would probably approach paediatric cardiology from both paediatrics and cardiology.

Goodwin also reported that the Joint Committee on Higher Medical Training would shortly be producing a document outlining the aims of the committee, the composition of the subcommittees, and synopses of the training programmes, with information on accreditation and recognition of hospital posts for training. Copies of the document would be available to trainees and training institutions and teachers.

The recommendations for career structure and staffing in cardiology, made by the Cardiology Committee of the Royal College of Physicians of London, had been received by the Department of Health who had not expressed disagreement with the general principles.

Goodwin emphasized that application to the Department for consultant posts must first have the maximum priority of the Regional Board or Area Authority.

18 Dewar proposed that the Annual General Meeting in 1974 be held in Newcastle, which was the venue of the Association of Physicians meeting, and it was agreed that this should be held on Thursday, 18 April.

The Society dined together at the Zoological Gardens. The President expressed regret that political turmoil had interfered with the Dublin arrangements, but expressed hope that, before too long, circumstances would again become favourable for a visit to that beautiful city. He paid a warm tribute to Shirley Smith for his long and arduous services to the Society as President and as Editor of the Journal. He would be relinquishing the editorship as from 1 January 1973 and his mantle would automatically fall on the shoulders of Walter Somerville. The Society would have complete confidence in the capacity of his successor to maintain and enhance the reputation of the Journal, now that it was appearing once monthly. He thanked the Society also for the privilege they had accorded him of holding the Presidency during the important period which included the World Congress. He emphasized the continuous growth and development of the subject and the valuable contribution which was being made to progress in cardiology by the British Heart Foundation. Every effort must be made to sustain basic scientific studies in the subject whose study was the inspiration of all our interest and activities. The Society had chosen John Goodwin as its new President and this gave him special pleasure in handing over to a friend and colleague of so many years, and one who had served the Society in so many capacities for so long. He also thanked Miss North and all the officers who had made the task of the President so smooth and easy.

A study of hyper-β- and hyperpre-β-lipoproteinaemia

Leon Simons, Sadiq Wahab, Alan Chait (all introduced), Dennis M. Krikler, and *Barry Lewis* (introduced)

Patients with coronary and peripheral vascular disease often have raised plasma concentrations of both cholesterol and triglyceride. The lipoprotein pattern may be either the rare 'broad β' abnormality or a simultaneously increased β-lipoprotein and pre-β-lipoprotein. The latter (the β+pre-β pattern) is common in patients referred to our Lipid Disorders Clinics. WHO has classified it as Type IIb.

We have studied 16 index patients with this pattern. Thirteen had ischaemic heart disease or peripheral vascular disease. Glucose tolerance and insulin responses were observed. Thirty-five first-degree relatives in 12 families were examined; 14 of these 35 had hyper-β-lipoproteinaemia. Four had excess of pre-β-lipoprotein; only 2 of the 35 had the β+pre-β pattern. In 13 of the 16 index patients, the hyper-β-lipoproteinaemia was shown to be familial.

An increase in pre-β-lipoprotein levels was demonstrably familial in only 2 kinships; in many patients it may have been secondary to associated disorders. Potential aetiological factors in the 18 patients with the β+pre-β pattern were: obesity (8), alcoholism (4), diabetes (2). By contrast, associated abnormalities occurred only once in 14 relatives with pure hyper-β-lipoproteinaemia.

We conclude that the β+pre-β pattern occurs most often when familial hyper-β-lipoproteinaemia is associated with an additional disorder which can predispose to raised pre-β-lipoprotein levels.

Population screening for coronary risk factors

Geoffrey Bourke, Noel Hickey, Ann Cruess-Callaghan (all introduced), Risteard Mulcahy, and *Gerard Gearty*

MEDISCAN, a population risk factor screening programme, was initiated by The Irish Heart Foundation in 1969. This communication records the results of screening in the first 13,000 subjects examined. The subjects were men between 30 and 60 years who were drawn from various urban areas and industrial concerns.

Nineteen per cent had a diastolic blood pressure of 95 mmHg or greater. Five per cent had a diastolic blood pressure of 110 mmHg or greater, of whom less than one-fifth had previously been detected.

Five per cent had electrocardiographic abnormalities according to the criteria of the Minnesota Code. Two per cent had probable or possible coronary heart disease.

Eight per cent had cholesterol levels greater than 300 mg/100 ml. Fifty per cent were current cigarette smokers. The 13,000 subjects had a mean weight 10 per cent above ideal weight. Twenty-five per cent were more than 15 per cent above ideal weight.

Only 12 per cent of subjects could be classified as low risk cases.

The response to advice on risk factor intervention in a group of subjects who were rescreened was reported. It is concluded that population risk factor screening may be a feasible and effective procedure in the primary prevention of coronary heart disease and stroke.

Anti-coronary care: the case for primary and secondary prevention

Richard Turner, David Illingworth, and Andrew Burt (last two introduced)

The prevalence of coronary heart disease in the Western world is high and the incidence is increasing, especially in middle-aged and younger men. The condition is multifactorial and the

causes are largely environmental. No spontaneous improvement is to be expected.

Prospective epidemiological studies have identified certain risk factors. Association does not prove causation but the probability is high. Most factors are in any case injurious to health, and benefit is likely to follow from their elimination or reduction. The evidence for these statements was summarized.

Inquiry has been made into the state of knowledge and attitudes of physicians and general practitioners. At present in this country there is a good deal of ignorance, scepticism, and apathy, and very little is being done about it.

Pilot studies carried out over the past three years on patients discharged from a Coronary Care Unit have been directed towards motivation to change inappropriate habits on a family doctor-hospital physician basis within the framework of the National Health Service.

The results of these studies as regards motivation towards secondary prevention were presented and have been encouraging.

The methods used, which are suitable for primary prevention in general practice, were briefly outlined and the probable direct and indirect benefits summarized.

Leucocyte adhesiveness and thrombosis

D. S. Banks (introduced), and J. R. A. Mitchell

In 1941 Payling Wright showed that when blood was rotated in a glass flask the platelet count after rotation was lower than the count before rotation. The difference between counts was described as the platelet adhesiveness and has been used as a test of platelet function. She also showed that the adherent platelets were in clumps on the wall of the flask and not spread as a monolayer. Other workers have related this phenomenon of platelet adhesiveness to thrombosis *in vivo* and have found a difference between patients with ischaemic heart disease and normal people (McDonald and Edgill, 1959).

Since leucocytes are also involved in thrombi we have investigated their adhesiveness using a similar technique. The white cell count in blood falls when the blood is rotated in a glass flask and the cells become attached to the glass in relation to the platelet clumps to produce an appearance similar to that seen in a thrombus. Factors affecting this were discussed. A study of the leucocyte adhesiveness in patients with ischaemic heart disease was described.

References

McDonald, L., and Edgill, M. (1959). Changes in coagulability of the blood during various phases of ischaemic heart-disease. *Lancet*, **1**, 1115.

Wright, H. P. (1941). The adhesiveness of blood platelets in normal subjects with varying concentrations of anticoagulants. *Journal of Pathology and Bacteriology*, **53**, 255.

Investigation of patients with angina and selection for aorto-coronary vein bypass graft: results of surgery in 30 patients

R. Balcon, A. F. Rickards, W. Walsh, and R. K. Wilkinson (last three introduced)

The treatment of angina by aortocoronary vein bypass graft is being widely practised, but the criteria for selection of patients for operation have not been clearly defined. We therefore present the results of investigation of 60 patients with coronary artery disease. Symptomatology was assessed by clinical grading and a standardized exercise test on a bicycle ergometer. Left ventricular function was evaluated by the response to stress by rapid pacing and also by left ventricular angiography. Thirty patients underwent surgery. The criteria for their selection were discussed. Particular reference was made to those patients who were not accepted for surgery. These patients fell into two broad categories. One group with severe left ventricular dysfunction and a second with surprisingly mild coronary artery disease. The functional assessment of this second group was compared to that of the surgical patients.

Finally, a comparison of the pre- and postoperative investigations in the 30 patients who underwent coronary artery surgery was presented.

Rehabilitation of patients with coronary heart disease

Risteard Mulcahy, and Noel Hickey (introduced)

The return to work experience of 296 male survivors under 60 years with first myocardial infarction is reported. All patients were subjected to an organized rehabilitation and secondary prevention programme with long-term follow-up.

Seventy-five per cent returned to work within 100 days and 93 per cent had returned by the end of the period of observation (6 months after admission of last patient).

Delay or failure to return to work was caused by social and psychological factors more than organic factors. Successful return to work was not influenced by the patient's social status nor by the type of employment. The severity of the initial infarct did not significantly influence return to work experience.

Ten patients returned initially to part-time work, of whom seven eventually returned to full-time work. Only six were required to change to a different occupation.

All patients returned to their preinfarction exercise experience, except for 14 who were taking significantly less exercise and 8 who were taking more. An average annual mortality of 3·7 per cent was noted on long-term follow-up of these patients. There is no evidence to suggest that early return to work adversely affects subsequent mortality.

Details of rehabilitation and secondary prevention programme were presented.

Classification of heart block using His bundle electrogram

Evan Fletcher, Patricia Morton, J. G. Murtagh, and *Soad Bekheit* (last two introduced)

The His bundle electrograms were recorded in 24 patients whose scalar tracings showed abnormal conduction of sinus impulses. Four groups of block were recognized, (1) PA block with delayed conduction in atrial preferential pathways, (2) A-H block with delayed conduction in the AV node, (3) HV block with delayed conduction in the His-Purkinje-System, (4) (HPS) combined block, with any combination of 1, 2, or 3. HV block is characteristically associated with bundle-branch block or trifascicular block. Mobitz type 1 and 2 occur at any site in the His-Purkinje-System. HPS block may be concealed within a normal PR interval of surface leads. Concealed conduction disturbances were revealed by abnormal impulses in the HPS and AV node. The His bundle electrogram demonstrated intact retrograde conduction late in atrial diastole in complete orthograde block but without penetration of the AV node thus supporting the concept of facilitation of conduction in the main

bundle of His. The precise definition of the site or sites of block and its degree can be related to the clinical history and provide objective evidence for drug treatment or artificial pacing, either temporary or permanent.

Study of mechanism and treatment of supraventricular tachycardia using His bundle electrograms

R. A. J. Spurrell (introduced) and Edgar Sowton

A group of patients with either a history of rapid heart action or proven attacks of tachycardia was studied using the technique of recording His bundle electrograms. Recordings were taken with bipolar electrode catheters from the low and high right atrial positions simultaneously with the His bundle electrogram. Reciprocal beats or runs of tachycardia were started using single electrical impulses triggered from the intra-atrial recording of the P wave with a preset delay to stimulate an atrial premature contraction with a prolonged P-His interval (one of the criteria necessary for the formation of re-entry beats).

Using this technique, the mechanism of onset and maintenance of the tachycardia was studied. This is thought to be re-entry in type and to occur above the bundle of His.

Various techniques for terminating the tachycardia have been studied. The mechanism of the action of beta-blockers, verapamil, and carotid sinus massage is discussed.

Termination of the tachycardia by pacing the atria at a rate lower than that of the tachycardia was illustrated and termination by firing either single or multiple impulses into the atria, triggered by the preceding intra-atrial P wave. These triggered impulses are fired at an appropriate delay in order to block the re-entry mechanism and allow sinus rhythm to take over.

The feasibility of using a reverse demand pacemaker therapeutically was discussed.

Sinoatrial dysfunction presenting with bradycardia or sinoatrial block

Beresford Crooke, *D. H. Dighton* (both introduced), A. Leatham, and H. Siddons

From a survey of 987 patients seen on the pacing unit of this hospital, 55 patients have been found who presented with transient or persistent sinoatrial bradycardia or sinoatrial block. Twenty-seven of these patients (22 male and 5 female) had AV conduction problems in addition (12 had complete AV block and 15 had bundle-branch block or first degree AV block). Twenty-eight patients (14 male, 14 female) had no electrocardiographic evidence of abnormal AV conduction and appeared to have isolated sinoatrial dysfunction. The difference between the two groups was discussed.

Sixteen patients (without complete AV block) chosen from the group as a whole have been studied using multiple physiological/pharmacological tests (reflex tests, responses to isoprenaline, atropine, neostigmine, baroreceptor sensitivity). In comparison with controls the responses of 9 of the 16 patients were found to be reduced overall. This group has detectable disturbances of function and may therefore have sinoatrial disease. Seven of these patients have bundle-branch block, 8 have had a history of multiple syncopal episodes, 6 have had to be paced.

Seven of the 16 had normal responses, 4 of these have had syncopal episodes, only 1 had been paced, the remainder having been satisfactorily treated with either long-acting atropine or isoprenaline or with no treatment at all.

It is suggested that these physiological tests of function (details given) are useful in the assessment and management of patients with sinoatrial dysfunction.

Heritable QT prolongation without deafness

O. Conor Ward

The clinical details of two affected children with this condition are presented. The electrocardiograms of living relatives have been studied and they indicate that inheritance has followed a dominant pattern, unlike the inheritance of the syndrome of Jervell and Lange Nielsen.

Syncope occurred in the affected patients due to attacks of ventricular fibrillation. These ultimately proved fatal in both. Biochemical data did not show any identifiable change associated with the attacks. Records of the onset and spontaneous termination of attacks showed that there was no direct relation between variation in the degree of prolongation of QT and the incidence of fibrillation.

Histological examination has been carried out in both cases. In one the right bundle followed an abnormal course and the left was attenuated. The myocardium showed patchy anisotropism. These features do not explain the abnormality in the resting electrocardiogram and the condition is considered to be related to an abnormality at cellular level.

Presentation and prognosis of single ventricle

Katherine A. Hallidie-Smith and M. M. Webb-Peploe

This communication reports the clinical presentation and electrocardiographic, radiographic, and haemodynamic features of 23 patients with single ventricle.

There were 8 infants, 7 children, and 8 adults, aged 17 to 30 years. The presenting features were cyanosis in 9, failure to thrive in 7, and the routine finding of a cardiac murmur in 7.

On angiography 17 patients had a single (morphologically left) ventricle and a small rudimentary right ventricular infundibular chamber. Of these, 12 patients had laevo-transposition of the great arteries (2 with pulmonary atresia and 1 with pulmonary stenosis). One patient had a normal position of the great arteries with pulmonary atresia. Five patients had indeterminate ventricular morphology, 3 with laevotransposition (2 with pulmonary stenosis), and 2 with normal great arteries (1 with pulmonary stenosis). In 1 patient the single ventricle was morphologically the right, with outlet from the right ventricle of both great arteries.

The electrocardiograms of 19 patients showed left ventricular hypertrophy. Eleven of the 15 patients with laevotransposition had qR1 patterns in V1 and rS1 patterns in V6.

Chest radiographs were useful in assessing pulmonary blood flow, but not in determining the position of the great arteries or ventricular morphology.

There were 4 deaths (all in early infancy) 2 were associated with pulmonary atresia and 2 with torrential pulmonary blood flow and a very high left atrial pressure. The long-term prognosis, which appeared to be largely determined by the pulmonary blood flow, was discussed.

Single atrium – a diagnostic and correctable entity

Jane Somerville, Donald N. Ross, and J. Keith Ross

Single atrium occurs in 3 per cent of atrioventricular defects. The diagnostic features, natural history, and surgical management have been studied in 12 patients with proven uncomplicated single atrium, aged 2 to 28 years.

The condition occurs mainly in the female subject and presents as an atrioventricular defect with signs of atrial septal defect, with murmurs of mitral regurgitation in 70 per cent and characteristic left axis deviation in 95 per cent. The correct anatomical diagnosis of single atrium can be made before investigation and is suggested by the association of central cyanosis, anomalies of caval drainage, and cardiac position apparent on the chest radiograph, and unusual P wave direction.

Investigation shows close identity of pulmonary and systemic arterial saturations and a bidirectional atrial shunt; pulmonary hypertension is rare unless there is a significant ventricular septal defect. Diagnostic confirmation is provided by left ventricular and atrial angiocardiography. Patients were disabled in childhood and adolescence and developed irreversible heart failure due to atrial or nodal dysrhythmias early.

The indications, problems, and long-term satisfactory results of surgical treatment were shown.

Evaluation of blood velocity and acceleration measurements in patients with coronary artery disease

A. F. Rickards, W. Walsh, R. K. Wilkinson (all introduced), and R. Balcon

It has been suggested that maximum acceleration of blood in the aorta is a sensitive indicator of left ventricular function. The introduction of a catheter mounted electromagnetic velocity probe has made such a measurement feasible in man.

Fifteen patients with coronary artery disease undergoing routine cardiac catheterization have been studied. The derivation of maximum acceleration from the velocity signal and the possible errors involved were discussed. A comparison between the values of velocity and maximum acceleration obtained in the ascending aorta and subclavian arteries was shown.

The effect of interventions altering left ventricular pre-load and after-load, changes after administration of lanatoside C and practolol, and the effect on velocity and acceleration of inducing cardiac pain by rapid pacing were presented.

Actions of beta-adrenergic blocking drugs assessed in patients with aortic Starr-Edwards prostheses

Marion Crouchman (introduced), Derek Gibson, and John Hamer

Three beta-adrenergic blocking drugs, propranolol, practolol, and M and B 17803a, were each studied in 6 male patients with Starr-Edwards aortic valve prostheses. The patients were exercised on a bicycle ergometer and recordings made of the electrocardiogram and phonocardiogram. Changes in ball travel time in the prosthetic valve were assessed from alterations in the interval between the onset of the QRS complex and the loud sound produced when the ball strikes the end of the cage. Changes in heart rate and ball travel time were obtained for three equivalent doses of each drug at rest and at three work loads on a bicycle ergometer.

All three drugs produced some prolongation of ball travel time with little alteration in blood pressure, suggesting that myocardial contractility was reduced. On exercise the prolongation of ball travel time produced by propranolol was significantly greater than that produced by practolol, when doses having a similar effect on heart rate were compared. The effects of M and B 17803a were intermediate between propranolol and practolol on exercise, but at the highest dose used there was a significant fall in ball travel time at rest which might be attributed to the intrinsic sympathomimetic activity of the drug.

Importance of intrinsic activity to action of practolol

J. Conway, M. Reeves (both introduced by G. Howitt)

Cardiac output falls less with practolol than with propranolol. We set out to determine whether this is due to membrane effects, intrinsic activity, or cardioselectivity.

In 6 anaesthetized dogs, practolol (2·8 mg/kg) produced an insignificant change in cardiac output (CO), but propranolol (0·8 mg/kg) administered thereafter caused a fall in CO of 16 ± 5 per cent and in heart rate (HR) of 6 ± 3 per cent and left ventricular dp/dt, 10 ± 6 per cent $P < 0{\cdot}01$.

Membrane stabilizing effects of propranolol are unlikely to be responsible for this since in further experiments D-propranolol (0·8 mg/kg) after practolol caused little change in CO, HR, or dp/dt. 4-Hydroxypropranolol, which possesses intrinsic activity but is otherwise similar to propranolol, likewise caused no reduction in CO, HR, or dp/dt, after practolol. These observations suggest that intrinsic activity assists in the maintenance of ventricular function after practolol. This view was further substantiated when a different cardioselective blocker (I.C.I. 66,082), which is devoid of intrinsic activity, is used in place of practolol. Subsequent administration of propranolol caused no change in CO, HR, or dp/dt.

Controlled clinical trial of beta-adrenergic blockade in hypertrophic obstructive cardiomyopathy (HOCM)

P. Hubner, G. Ziady, G. Lane, R. Pridie, and J. Scales (all introduced by J. F. Goodwin)

Though there are theoretical advantages, supported by the results of acute haemodynamic studies, to suggest that beta-adrenergic blockade would be valuable in the treatment of hypertrophic obstructive cardiomyopathy, there has been no controlled objective assessment of this therapy. A double-blind cross-over form of trial has been conducted to assess the effects of propranolol (320 mg/day), with those of practolol (800 mg/day) and those of a placebo. Each preparation was administered orally during 4-week periods to 16 patients with hypertrophic obstructive cardiomyopathy. Symptoms were assessed using a diary card, and objective effects were studied with the apex cardiogram.

Both propranolol and practolol improved dyspnoea and also angina. Propranolol was more effective than practolol in the relief of angina. Both propranolol and practolol reduced the abnormally large 'a' wave of the apex cardiogram. This reduction was slightly greater with propranolol.

This trial offers support for the use of beta-adrenergic blockade in hypertrophic obstructive cardiomyopathy, and suggests that propranolol may have marginal advantages over practolol.

The apex cardiogram findings suggest that symptomatic improvement may be due to reduction of a raised left ventricular end-diastolic pressure.

Continuous recording of arterial pressure and electrocardiogram in unrestricted patients

W. A. Littler, A. J. Honour, F. H. Stott (all introduced), and P. Sleight

Casual recordings of blood pressure may sometimes be unreliable, particularly in patients with labile hypertension, while patients with ischaemic heart disease or paroxysmal arrhythmias are notoriously 'normal' when examined in the outpatient clinic.

We will describe a four-channel miniature tape recorder which is now commercially available and may be used to record blood pressure, electrocardiogram, or other variables in subjects outside hospital. The apparatus which records phasic arterial pressure directly is an improvement on the system previously described (Bevan, Honour, and Stott, 1969) and consists of a capacitance transducer and a special perfusion pump.

The advantage of the present system over the earlier photographic recorder is that the record is on magnetic tape and it is therefore possible to replay the records at variable speeds and thus analyse individual pulse beats and the electrocardiogram. A marker channel allows the patient to record the time of angina, tachycardia, or simple everyday events.

This system allows recordings to be made without the presence of an observer while the patient is virtually completely unrestricted.

Illustrative examples were presented of records showing the behaviour of arterial pressure and the electrocardiogram during the activities of a normal working day in patients with hypertension, angina, and arrhythmias.

Reference

Bevan, A. T., Honour, A. J., and Stott, F. H. (1969). Direct arterial pressure recording in unrestricted man. *Clinical Science*, **36**, 329.

Recent modifications in use of profound hypothermia in surgery of congenital heart disease

C. E. Drew, I. M. Anderson, D. Howat, J. Bailey, R. Lea, D. Patchett, M. Sabbapathy (last five introduced), and A. Harris

A method of performing open heart surgery during circulatory arrest after the induction of profound hypothermia was described in 1959.

Modifications were brought into clinical use late in 1968, which allows easier balance of the artificial pulmonary and systemic circulations, improved perfusion of the lungs, and a lower priming volume. A crystalloid solution is used to prime the extracorporeal circulation and blood is not given until surgery is nearly completed.

A consecutive series of 188 patients with congenital heart disease between the ages of 3 months and 60 years has been treated at Westminster and St. George's Hospitals, including most examples of congenital heart lesions amenable to open heart surgery, except for uncomplicated pulmonary stenosis. Over half the patients were 5 years of age or less and a quarter 3 years of age or less. Of 6 cases which were inoperable at cardiotomy, 3 died; in 7 cases where previous operation had been inadequate, abandoned, or produced complications, there were 2 deaths. In the remaining 175 patients there was a hospital mortality of 6 (3·4%).

A brief description of the technique, its advantages, and the operative results and complications was given.

Factors influencing onset of ventricular fibrillation following coronary artery occlusion in a subhuman primate (Cape Chacma baboon)

K. Bruyneel, P. Owen, W. Lubbe, E. Simson, M. Berman (all introduced), and L. H. Opie

Most previous experimental work relating the effects of coronary artery occlusion to arrhythmias has been done on animals developmentally far removed from man such as the dog or pig. We, therefore, studied the effect of coronary artery occlusion on a subhuman primate. In 40 open-chested male baboons, ventricular fibrillation developed consistently after major arterial occlusion, and frequently after branch artery occlusion. No area of the left ventricle was immune. Lesions below 5 per cent in size never caused fibrillation. After coronary artery ligation, there was usually a dysrhythmia-free period of 15 to 60 minutes before the sudden onset of ventricular fibrillation. Biopsy tissue was analysed for high-energy phosphates, K^+, Na^+, glycolytic compounds, and homogenate *p*H. Fibrillation was associated with marked accumulation of H^+ (*p*H 6·0 or less; control *p*H 7·0), but with relatively slight tissue K^+ depletion. The severity of tissue acidosis suggests poor collateral flow to the infarcting myocardium.

The relevance of these results to the problems of ventricular fibrillation occurring within one hour of acute myocardial infarction in man was considered.

Effect of nicotinic acid on myocardial metabolism

B. W. Lassers, M. L. Wahlqvist, L. Kaijser, and L. A. Carlson (last three introduced)

Acute myocardial infarction is accompanied by a rise in plasma FFA concentration, and it has been suggested that these FFA may inhibit glucose uptake by the myocardium and may also have a direct arrhythmogenic effect on the ischaemic heart. Nicotinic acid (NA) is a powerful inhibitor of lipolysis in adipose tissue and reduces plasma FFA levels.

In order to study the effect of NA on myocardial metabolism, it was given as a continuous intravenous infusion to 10 healthy subjects and arteriovenous differences in concentration of various substrates were measured across the heart at rest and also during prolonged exercise which is known to both increase myocardial energy requirements and to mobilize FFA from adipose tissue.

NA was found to shift myocardial energy metabolism both at rest and during exercise from a predominant utilization of blood lipid substrates to a predominant utilization of blood carbohydrate substrates. The results suggested that this might have been due, at least in part, to the removal of an inhibitory effect of FFA on glucose uptake by the myocardium. These findings raise the possibility that NA-like compounds may have a role in the metabolic management of acute myocardial infarction.

Limitations of lignocaine in control of early ventricular dysrhythmias complicating acute myocardial infarction

J. S. Geddes, S. Webb (both introduced), and J. F. Pantridge

The effect of lignocaine given as an intravenous bolus of 100 mg with a continuous infusion of 2 mg/min was assessed in 27 patients with ventricular

ectopic beats (VEB) occurring within 4 hours of the onset of acute myocardial infarction.

An increase in the frequency of VEB occurred in 5 (19%). Temporary control of ventricular irritability was achieved in 5 (19%). Control of VEB by the drug was considered adequate in only 8 (30%). Ventricular tachyarrhythmia occasionally developed in relation to lignocaine therapy; prematurity of VEB increased in one patient.

Confirmation that lignocaine may increase ventricular irritability was obtained experimentally using an animal re-entry model. The effect was dose-dependent and may be correlated with known biphasic electrophysiological effects of lignocaine. Shortened recovery time at the Purkinje-myocardial junction associated with moderate dosage may enhance re-entry by facilitating conduction of premature re-entrant impulses originating in the ischaemic zone.

The effects of lignocaine in the acute phase of myocardial infarction are unpredictable and require careful monitoring. Increase in dosage may be required or the response may demand that lignocaine therapy be stopped immediately.

Apical systolic murmurs related to mitral regurgitation at angiography in ischaemic heart disease

Klaus Gahl, Peter Caspari, Michael Pearson, Richard Sutton (all introduced), and Lawson McDonald

Left ventricular cineangiography was performed in 84 patients with ischaemic heart disease, of whom 63 were men and 21 were women. Their ages were from 24 to 68 years (average 50). Careful assessment was made before the investigation both clinically and phonocardiographically of any apical systolic murmurs. At the time of angiography ventricular ectopic beats resulting in mitral regurgitation were noted, and related to the type of catheter used, and its position. Ventricular ectopic beats were considered to be solely responsible for mitral regurgitation in about half the patients. In the remainder who had demonstrable mitral regurgitation apical systolic murmurs were always present. The morphology of the apical systolic murmur will be related to the severity of mitral regurgitation as judged by angiography, and considered in relation to the arterial blood pressure, the electrocardiographic pattern, left ventricular and left atrial size, and left ventricular end-diastolic pressure, and in 30 patients to operative findings.

Surgical treatment of mitral regurgitation secondary to myocardial infarction

Magdi H. Yacoub, Malcolm Towers, and Walter Somerville

Between August 1969 and November 1971, 12 patients with mitral regurgitation secondary to myocardial infarction were treated surgically. Their ages ranged between 53 and 71 years, 9 were men and 3 were women. This series does not include patients whose mitral regurgitation is due to 'idiopathic' rupture of the chordae tendineae.

Two patients had complete rupture of the posterior papillary muscle 1 and 7 days, respectively, after infarction. This resulted in 'total' MR, cardiogenic shock, and severe pulmonary oedema. The systolic murmur in both patients had a distinctive character. Emergency valve replacement resulted in immediate improvement in their conditions. Both patients are alive and well 6 and 18 months after operation.

Two patients had acute left ventricular aneurysm with stretching of the infarcted papillary muscles. Emergency excision of the aneurysm and emergency valve replacement resulted in improvement of the haemodynamic state. However both patients died 6 and 13 days later of recurrence of the low output state in 1 and renal failure in the other.

In 8 patients the mitral regurgitation was due to chronic papillary muscle dysfunction; the valve was replaced in 6 and annuloplasty performed in 2. Double saphenous bypass graft was also performed in 2. There was no hospital mortality in this group. All patients have been followed up for periods of up to 20 months. It is concluded that surgical correction of mitral regurgitation secondary to myocardial infarction is a worthwhile procedure which may be life saving in the acute stage and can be achieved with a low mortality in the chronic stage.